Descriptions of the First Instar Larvae of Three Species of Epicautine Blister Beetles

(Coleoptera: Meloidae)[1]

John D. Pinto

Department of Entomology, University of California, Riverside 92521

The first instar larvae of *Pleuropompha costata* (LeConte), *Epicauta insignis* Horn, and *E. corvina* (LeConte) are described below. Descriptions of the two *Epicauta* at this time will facilitate their comparison with members of the *Epicauta maculata* Group in a forthcoming monograph focusing on the latter taxon. Of the two species included in *Pleuropompha,* only the larva of *P. tricostata* Werner has been described (MacSwain, 1956). In addition to the description of the larva of the second species, *P. costata,* a key to species and a discussion of the traits separating *Pleuropompha* from *Epicauta* are included.

To facilitate species comparisons, descriptions closely follow the terminology and format employed by MacSwain (1956) in his extensive study of the first instar larvae of the Meloidae. All quantitative data represent means based on five (slide mounted) specimens that emerged from the same egg mass. Where variation was substantial, the range of measurements is given instead of the mean. Roman numerals refer to segment number of the structure specified unless otherwise stated. Exemplars of the species described here will be deposited in the California Academy of Sciences.

Pleuropompha costata (LeConte)
(Fig. 1)

Color. Head, thorax and abdominal segments I-V yellow brown, abdominal segments VI-IX dark brown. *Head* 0.92 as long as wide, as long as or only slightly shorter than pro- and mesothorax combined; lateral margins gradually narrowing behind middle to distinctly emarginate; gula ½ as long as greatest head width, gular setae ½-⅔ as long as greatest gular width. *Antennae.* II twice as long as III, two long and one short seta on apex; sensory organ slightly shorter and wider than III; terminal seta short, only ¾ the length of II. *Mandibles* very slender, with 20 very small, poorly delineated teeth; teeth slightly convex apically; apical mandibular seta slightly longer than basal seta. *Maxillary palpi.* III twice as long as wide, lateral margins curved, widest medially, narrowest apically; sensory area of III extending 3/5 the length of segment; papillae of sensory area short, sparse, ca. 35 in number; two-segmented sensory appendix short, its length slightly less than ½ maximum width of II of labial palpi. *Labial palpi.* I ½ as long as II; II slightly over twice as long as greatest width; only a single seta on II, this seta barely attaining apex of segment. *Thorax.* Prothorax subequal in length to meso- and metathorax combined; line of

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dehiscence absent from metanotum. *Abdomen.* Ten setae in posterior marginal rows on terga I-VIII; spinelike evaginations at base of marginal setae on I-VII short, very poorly sclerotized (Fig. 1), most strongly developed on II-V; posterior marginal setae on V as long as or only slightly shorter than length of segment; setae of median transverse tergal rows relatively long, those on V ⅓ as long as longest marginal seta; pleurites ventral, pleurite V as long as wide, spiracle located in lateral half; abdominal spiracle I 4/5 the diameter of mesothoracic spiracle; abdominal spiracles II-VII equal in diameter, all slightly smaller than I; spiracle VIII smaller than VII; sternum of segments I-VII weakly sclerotized, VII with two medial sclerotized areas larger than those on preceeding segments, each including two setae, areas occasionally joined; segments VIII and IX well sclerotized. Legs with distance from articulation to apex of first coxa less than twice as long as greatest coxal width; anterior femur with seven lanceolate setae; anterior claw with longest seta reaching a point 9/10 the distance from base to apex of claw; claw long, length ¼ greater than maximum gular width. *Body length* 2.7 mm, caudal setae 0.8 mm.

Remarks. Pleuropompha, a genus questionably distinct from *Epicauta,* contains only two species, both occurring in the southwestern United States and northern Mexico. The larva of *P. tricostata* Werner was described by MacSwain (1956). MacSwain believed that *Pleuropompha* could be distinguished from *Epicauta* by the rounded rather than spinelike evaginations at the base of the posterior marginal rows of setae on the abdominal terga. Although difficult to observe under the light microscope, the scanning electron microscope reveals typical spinelike evaginations on segments I-VII in both *P. costata* and *P. tricostata* (Figs. 1-3). At present then, we are left without a single larval characteristic to separate these two genera. Only in the adult stage are they easily distinguishable (Werner, 1943; Pinto, 1973).

Assuming that the spinelike evaginations are observed, both species of *Pleuropompha* will run to couplet 16 in MacSwain's key to *Epicauta.* The following combination of characters should distinguish them from all known *Epicauta:*

Head capsule emarginate; mandibles extremely slender, with 20 very small teeth; femur with seven lanceolate setae; abdominal segments not uniformly colored, VI-IX darker than II and IV; abdominal sterna I-VII incompletely sclerotized; abdominal terga with a posterior marginal row of ten setae, terga I-VII with spinelike evaginations at base of posterior marginal setae relatively short and very poorly sclerotized.

The two species of *Pleuropompha* can be separated by the following key.

1a Terminal seta of antenna distinctly longer than antennal segment II; II of the labial palpi with two or three long setae; claws relatively short, length of claw on anterior leg slightly less than greatest gular width; setae of median transverse row of abdominal terga short, those on V only 1/5-1/6 as long as longest marginal seta; metathorax and abdominal segments I and II darker in color than III-V ..... *P. tricostata*

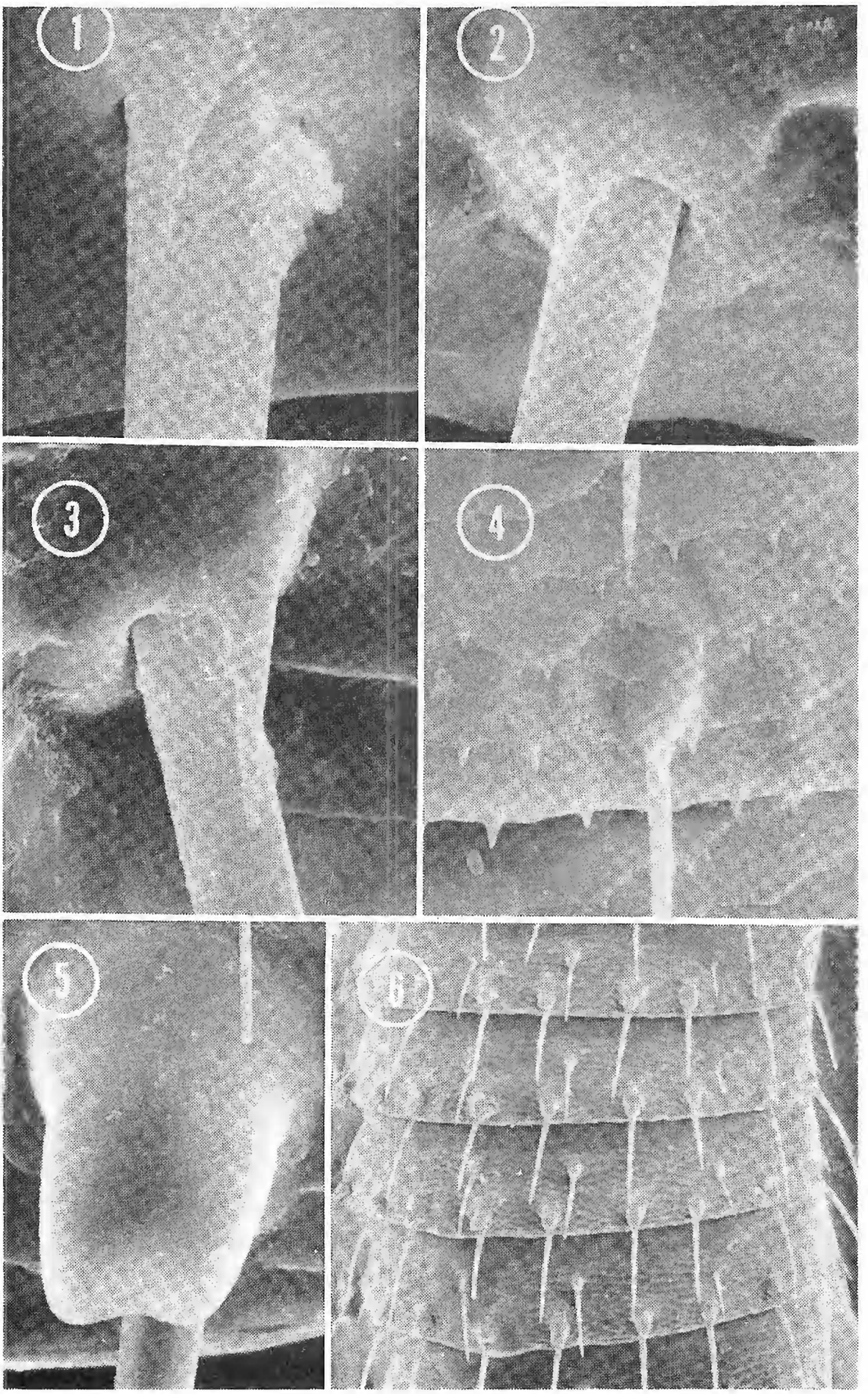
1b Terminal seta of antenna only ca. 3/4 the length of antennal segment II; II of labial palpi with only a single long seta; claws relatively long, length of claw on anterior leg ca. 1/4 greater than maximum gular width; setae of median transverse row of abdominal terga long, those on V ca. 1/3 as long as longest marginal seta; metathorax and abdominal segments I and II similar in color to III-V ..... *P. costata*

Material studied. Larvae from a mass of 110 eggs; adults collected 7 mi. SE. Deming, New Mexico, VIII-2-1976. Larvae from a mass of undetermined size; adults collected 6.8 mi. S. Apache, Cochise County, Arizona, VIII-5-1972, J.D. Pinto. Quantitative data are based on New Mexico material.

Epicauta insignis Horn
(Fig. 4)

Color. Yellow brown, head slightly darker. *Head* 0.98 as long as wide, 1/4 shorter than pro- and mesothorax combined; laterial margins moderately to extremely emarginate; gula 1/2 as long as greatest head width, gular setae slightly less than 1/2 as long as greatest gular width. *Antennae.* II twice the length of III, two long and one short seta on apex, narrowed at base; sensory organ slightly wider and about as long as III; terminal seta 1/2 longer than II. *Mandibles* moderately robust, with 11-15 apically flattened teeth, 9 teeth visible in outline; apical mandibular seta slightly longer and stouter than basal seta. *Maxillary palpi.* III 3/4 longer than broad, evenly convex on outer margin, not swollen basally; sensory area of III extending slightly over 1/2 length of segment; papillae of sensory area short, sparse, ca. 40 in number; two-segmented sensory appendix relatively long, its length 4/5 maximum width of II of labial palpi. *Labial palpi.* I 1/2 as long as II; II twice as long as greatest width; single seta on II barely attaining apex of segment. *Thorax.* Prothorax slightly longer than meso- and metathorax combined; line of dehiscence extending full length of pro and mesonotum, indicated at apex of metanotum or not. *Abdomen.* Ten setae in posterior marginal row on terga I-VIII; spinelike evaginations (Fig. 4) well developed at base of marginal setae on I-VII; evaginations absent at base of median transverse row; posterior marginal setae on V slightly less than 1/2 as long as segment; setae of median transverse row slightly over 1/2 as long as longest marginal seta; pleurites ventral, pleurite V wider than long, spiracle located in lateral half; abdominal spiracle I 2/3 diameter of mesothoracic spiracle, slightly longer than abdominal spiracle II, remaining spiracles subequal to II; sternum of segments I-VII weakly ceeding segments, each with two setae; segments VIII and IX well sclerotized. *Legs.* Seven lanceolate setae on anterior femur; anterior claw with longest seta almost reaching apical 9/10 of claw; claw 3/20 longer than greatest gular width. *Body length* 1.6mm., caudal setae 0.3mm.

Remarks. The larva of *E. insignis* is most similar to that of *E. nigritarsis* (LeConte), a species placed in Group G by MacSwain (1956) along with *E. maculata* (Say) and *E. pardalis* LeConte. A close relationship between *E. insignis* and *E. nigritarsis* is also suggested by adult anatomy (Werner, 1945; Werner *et al.*, 1966). The larvae of both species run to couplet 14 in MacSwain's key to *Epicauta*. Differences between the two are as follows.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In *E. nigritarsis* the sensory papillae on III of the maxillary palpi are relatively dense with ca. 60 in number (not 100 as indicated by MacSwain); in *E. insignis* only ca. 40 occur. Also, the two-segmented sensory appendix on III of the maxillary palpi is long in *E. insignis* with a length ca. 4/5 the maximum width of II of the labial palpi; in *E. nigritarsis* its length is only 1/2 the width of this segment. The two species can also be separated by the spinelike evaginations at the base of the marginal setae on the abdominal terga. In *E. nigritarsis* they are rather short (no more than 1/5 as long as their associated setae) and only occur on segments I-V. In *E. insignis* they are longer (up to 1/3 as long as their associated setae) and occur on I-VII.

In various species of Epicautina the cuticular reticulae comprising the surface of the abdominal terga are produced into a short spine apically. These are probably serially homologous to the evaginations at the base of the marginal setae. In *E. insignis* the reticulae on the apical half of abdominal segments I-VII in particular, are strongly spinose (Fig. 4). These spines are easily visible under the light microscope at 200X. In *E. nigritarsis* very few of the reticulae are spinose. The spines in this species are also obsolescent and can only be verified under the light microscope at magnifications approaching 500X.

Material studied. Larvae from a mass of 257 eggs; adults from Pinery Canyon, Chiricahua Mts., 5000 ft. elev., Cochise County, Arizona, VII-25-1972, J.D. Pinto.

Epicauta corvina (LeConte)
(Figs. 5-7)

Color. Head golden brown; prothorax yellow with a broad, irregular, brown band across middle; mesothorax and abdominal segments I-V yellow, metanotum and abdominal segments VI-IX dark brown. *Head* (Fig. 7). 0.94 as long as wide, slightly longer than pro- and mesothorax combined; lateral margins broadly arcuate to subparallel, not emarginate; gula slightly less than 1/2 greatest head width, gular setae 2/3 as long as maximum gular width. *Antennae.* II twice the length of III, two long and one short seta at apex; sensory organ slightly wider than III, subequal in length; terminal seta 2/3 longer than II. *Mandibles* extremely robust, with 8-9 large, apically acute teeth; 4-5 teeth visible in outline; mandibular setae well developed, apical seta considerably longer and stouter than basal seta. *Maxillary palpi.* III 3/4 longer than broad, expanded at outer basal margin; sensory area extending 2/3 the length of segment; papillae of sensory area moderately long and dense; length of two-segmented sensory appendix slightly more than 1/2 maximum width of II of labial palpi. *Labial palpi.* I 1/3 as long as II; II twice as long as broad, with a single seta barely attaining apex of segment. *Thorax.* Prothorax 1/10 longer than meso- and metathorax combined, almost twice as broad as long; line of dehiscence extending full length of pro-and mesonotum, absent from metanotum; meso- and metanotum with short, robust

Figs. 1-5. Scanning electron micrographs of sclerous evaginations at base of posterior marginal setae on abdominal terga of epicautine first instar larvae. Micrographs are of setae on abdominal segment V in *E. insignis,* and on IV for all other species. 1. *Pleuropompha costata,* 6000X; 2. *P. tricostata,* 4000X (short variant); 3. *P. tricostata,* 4000X (long variant); 4. *Epicauta insignis,* 1400X; 5. *E. corvina,* 2000X. Fig. 6. Scanning electron micrograph of abdomen of *E. corvina* showing sclerous evaginations on both theposterior and medial rows of tergal setae (140X).

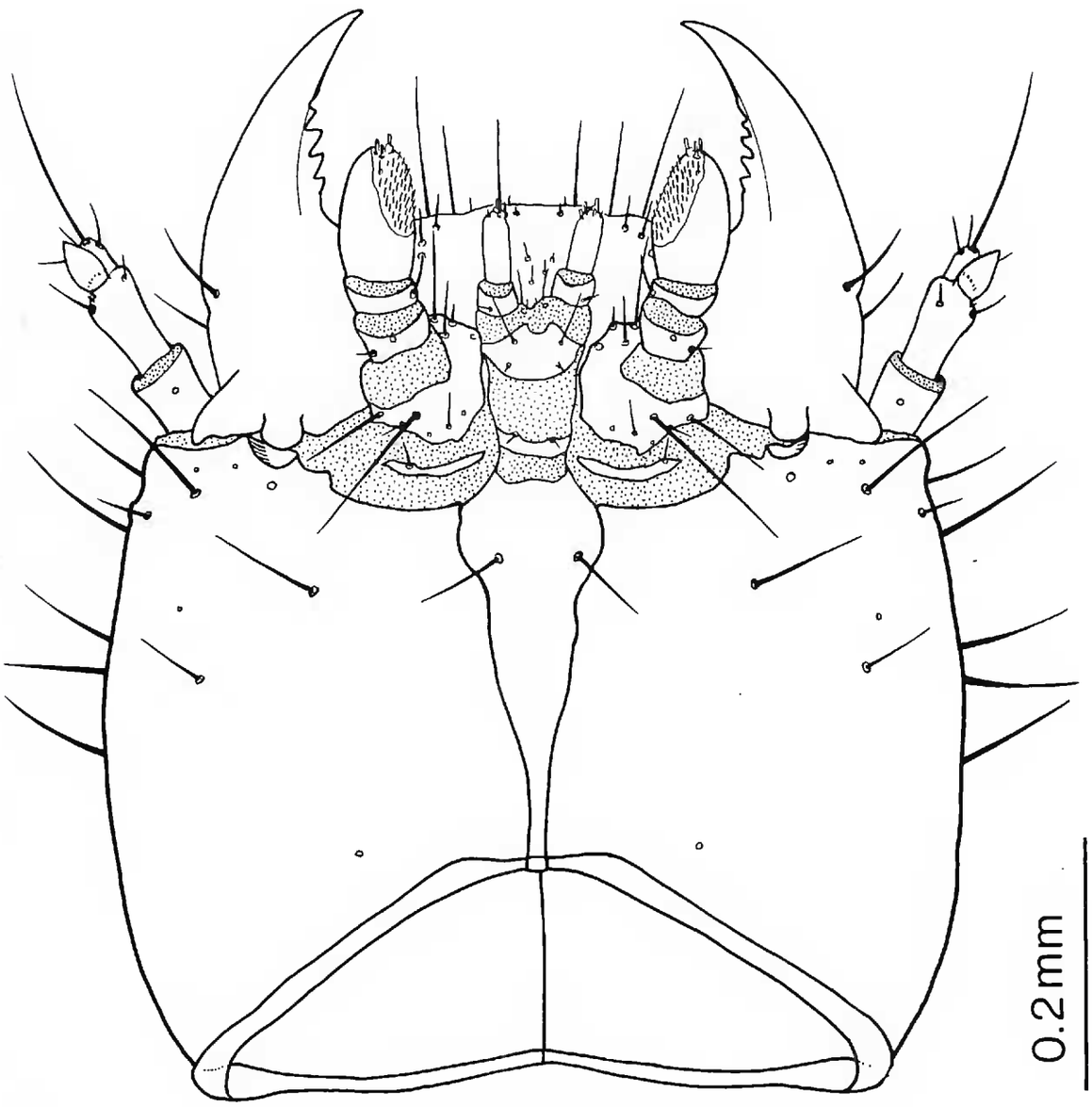

Fig. 7. Head (ventral view) of first instar larva of *Epicauta corvina*.

integumental evaginations at base of setae along posterior margin; metanotum also with evaginations at base of two central setae of transverse medial row. *Abdomen.* Ten setae in posterior marginal row on terga I-VIII; integumental evaginations (Fig. 5) robust, apically truncate, present at base of marginal setae on I-VII; evaginations also well developed at base of median transverse row of setae on I-IV or V (Fig. 6); posterior marginal setae on V subequal in length to that of segment; pleurites ventral, pleurite V wider than long, spiracle located in lateral half; abdominal spiracle I 7/10 the diameter of mesothoracic spiracle, slightly larger than abdominal spiracle II, remaining spiracles subequal to II; sternum of segments I-VII weakly sclerotized; VII slightly better sclerotized than preceeding segments, with two medial sclerotized areas each including three (rarely two) setae; segments VIII and IX well sclerotized. *Legs.* Distance from articulation to apex of first coxa 2 1/2 times as great as greatest coxal width; anterior femur with eight lanceolate setae; anterior claw with longest seta reaching a point 9/10 distance from base to apex of claw; claw length less than width of gula. *Body length* 2.7 mm, caudal setae 0.7 mm.

Remarks. E. corvina is similar to *E. pensylvanica* (Degeer) and *E. funebris* Horn as judged by adult characteristics (Werner, 1945; Wer-

ner, et al., 1966). These two species as well as *E. cinerea* (Forster) and *E. pestifera* Werner (as *E. solani* Werner) were placed in larval Group B by MacSwain (1956). The larva of *E. covina* is not easily placed in any of MacSwain's groups but appears to most resemble B and C. Like species in these groups, *E. corvina* has cuticular evaginations at the base of the transverse median row of setae on the anterior abdominal terga. Also, like *E. funebris* the head capsule is not emarginate. A character shared with members of Group C is the more normal (= seven) number of lanceolate setae on each femur. The mandibles, however, are even more robust than those found in members of groups B and C, and are most similar to those of *E. oblita* (LeConte) and *E. callosa* LeConte (Group J).

E. corvina is easily distinguished from all described North American *Epicauta* by the presence of the extremely robust, truncate evaginations associated with the tergal setae (Figs. 5,6). In all other *Epicauta* these evaginations are spinelike (e.g. Figs. 1-4). *E. corvina* runs to couplet 5 in MacSwain's key to *Epicauta*. The distribution and shape of the integumental evaginations, and the presence of eight lanceolate setae on the femora will easily separate it from all species keyed beyond that point.

Material studied. Larvae from a mass of 264 eggs; adults from 1.7 mi. E. Apache,Cochise County, Arizona, IX-5-1970, J.D. Pinto.

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